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Review schemes and reviewers' selection criteria in the Life Cycle Data Network framework, and at global level

Eligibility criteria, and review rules for different schemes

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The sections 2.4-3.4 and part of 3.6 related to the 'Global Guidance Principles for Life Cycle Assessment Databases' have been derived from the documents developed under the UNEP-SETAC Life Cycle Initiative 'umbrella'.

Particularly, within the flagship 2a of the LC-initiative, the 'Shonan Database Conformance Project' has the following goals: to create an interactive map to visualise databases worldwide, with properties; to develop conformance criteria; and to apply the criteria to existing databases. In this framework the working group coordinated by Dr Andreas Ciroth (Greendelta Gmbh), has worked on the creation of a report called 'Life Cycle Inventory Dataset Review Criteria Development — Review and Shonan Global Guidance Principles Criteria'. The document has been used to develop some specific sections of this report (2.4 and part of 3.6).

Abstract

Quality and consistency of life cycle inventory (LCI) datasets are essential in public policy and business contexts, as well as in publicly disclosed information in business to business and business to consumer communication. This can be assured through a critical review of the underlying data and of the life cycle assessment studies themselves. A review assesses to what extent a life cycle assessment study or related data meets predefined requirements. Undertaking a review can help avoid errors, ensure that all options or method requirements have been appropriately taken into account, and hence increase stakeholder confidence and buy-in into results. Failing to perform a review can cost significantly more in the long term than is initially apparently saved.

The principles for reviews are very briefly addressed in the ISO 14040 series, while other LCA-based standards define some review requirements in more detail. The review requirements reported in this document conform to the LCA-based ISO standards. However, different schemes, such as the International Life Cycle Data System (ILCD), the Product- and Organisation- Environmental Footprint (PEF/OEF), and the ILCD Entry-Level Requirements (ILCD-EL), go beyond the ISO requirements, in order to endorse more precise and qualified reviews. The overall objective is to assist quality assurance of life cycle data, studies and to enable the provision of reliable decision support in business and government.

The main goal of this report is to better define the requirements for the review process in the ILCD-EL scheme, released in 2012. The improvements relate to the eligibility criteria for reviewers and the harmonisation of reporting systems for all the allowed types of reviewer.

The document also gives an overview of the review rules in different ILCD-based schemes, also in comparison with the Global Guidance Principles for Life Cycle Assessment Databases, developed under the UNEP-SETAC life cycle initiative.

A review template for life cycle inventory (LCI) datasets, to be shared through the Life Cycle Data Network ([1]), considering the ILCD entry-level requirements, is also provided.

The main target audience for this guide are the LCA reviewers who are interested in being identified as qualified reviewer within the Life Cycle Data Network (LCDN) System and ILCD-based schemes, but also the data developers and practitioners that are looking for appropriate reviewers for data/studies validation.

The eligibility of reviewers can be automatically assessed within the Reviewer Registry of the European Platform on LCA, available in the Resource Directory section ([2]). The reviewer qualification scheme is based on a self-declaration of skills, from which the Reviewer Registry can automatically assess the eligibility under different schemes (so far 'full' ILCD Compliance, PEF/OEF and ILCD entry level, the latter according to the new rules defined in this report).

The main qualification aspects, taken into account for the eligibility assessment are: expertise in life cycle assessment methodology; knowledge of applicable review rules;

([1]) http://eplca.jrc.ec.europa.eu/LCDN/
([2]) http://eplca.jrc.ec.europa.eu/ResourceDirectory/

experience in review or verification; and sectorial expertise (i.e. technical expertise on the process or product captured by the dataset under review).

The new criteria, introduced in the ILCD-EL scheme, follow the same approach defined in the Environmental Footprint and the 'full' ILCD compliance. They include minimum thresholds (less stringent than the other two schemes, in terms of total experience needed) in the abovementioned qualification aspects that need to be passed, either as a single reviewer or in a team.

The new set of entry-level requirements defined in this document will become mandatory for the submission of new datasets into the Life Cycle Data Network, from 1 July 2017, after a transitional period.

1 Introduction

The global marketplace is increasingly demanding science-based, quality-assured and comparable information regarding the environmental performance of products and services. Life cycle assessment (LCA) is one of the most advanced methods for deriving such information on a quantitative, comparable basis. LCA is internationally standardised in the ISO 14040 series.

Critical review of LCAs is addressed in the ISO 14040 ([3]) series in a broad manner, giving a framework for conducting such a review. Details on reviewer qualifications and review procedures however are not provided. This means that the relevant ISO standards, alone, do not provide practical guidance for reviewing Life Cycle Inventory data, overall LCA studies and associated applications. Therefore detailed and specific guidance for reviewing LCA work is needed.

A review framework made of coherent review schemes is expected to considerably increase validity and comparability of data and studies, lower the efforts and costs for review, and support higher trustworthiness and acceptance of LCA. This is a pre-requisite for the regular use of LCA in business and public policy contexts.

The *International Reference Life Cycle Data System (ILCD) Handbook* ([4]) provided a series of guidance documents as a basis for consistent and quality-assured life cycle data and assessments. The *ILCD Handbook* also provided a specific guidance on Reviewer qualification for Life Cycle Inventory datasets ([5]). However, when the handbook was released in 2010, the requirements were considered too strict and scarcely accessible for the large majority of LCA practitioners at EU and worldwide level. This is why the ILCD scheme, originally foreseen to be the basis for the Life Cycle Data Network, is now only partially used. A simplified set of entry level (EL) requirements for LCI data was released in 2012 ([6]). Moreover, the PEF/OEF scheme ([7]), that follows the EL requirements and considers a few additional compliance rules, was issued in 2013. In this framework the 'full' ILCD compliance is likely not necessary anymore, also for the reviewer selection; however, in the new schemes, several aspects are taken directly from the *ILCD Handbook*, therefore the document is still valid. In this document the new minimum rules of eligibility for reviewers, entitled to review LCI data complying with the ILCD Entry Level requirement, are defined.

At global scale, the United Nation Environment Programme (UNEP), in collaboration with the Society of Environmental Toxicology and Chemistry (SETAC), in the framework of the life cycle initiative, released in 2011 the 'Global Guidance Principles (GGP) for Life Cycle Assessment Databases' ([8]), also known as 'Shonan Principles' or 'Shonan Guidance'. The document provides detailed guidance on how to develop unit and aggregated process data, as well as carry out data review and documentation, and other aspects linked to LCI-LCA practice and datasets development.

This initiative led to the establishment of several other undertakings under the UNEP umbrella, including a project for the development of conformance criteria, and review process within the GGP scheme, and a project for the establishment of a global network on interoperable LCA data (also known as GLAD network). The development of

([3]) International Organization for Standardization. DIN EN ISO 14040-44. 2006.
([4]) ILCD Handbook — General guide for Life Cycle Assessment — Detailed guidance.
([5]) ILCD Handbook — Reviewer qualification for Life Cycle Inventory datasets.
([6]) ILCD Data Network — Compliance rules and entry-level requirements
([7]) COM(2013) 196
([8]) Global Guidance Principles for Life Cycle Assessment Databases — A basis for greener processes and products.

conformance criteria aims at extracting and coordinating the information contained in the GGP, and making it applicable in a coordinated manner, reducing the possibility of 'free' interpretation of the guidance by different practitioners or reviewers.

The report is structured in two 'core' chapters:

- Chapter 2 describes the general rules in order to conduct a compliant review of datasets (or LCA studies), in different schemes (i.e. ILCD entry level, PEF/OEF, 'Full' ILCD and the GGP conformance criteria). It also defines a new, fine-tuned, set of rules for the ILCD-EL requirements, aligning the entry level to the other ILCD-based schemes, with the same type of requirements, but with a slightly lower level of experience required in different eligibility criteria.

- Chapter 3 defines the reviewer's minimum qualification, required for eligibility in different schemes, as well as the type and number of reviewer(s) required. As regards the ILCD-EL scheme, the minimum requirement for reviewers is firstly released in this report.

An updated review template is attached in the annexes, Annex 1 contains the report, with some comments on how to fill in the different fields; Annex 2 includes the clean template, which can be used for the review of ILCD-EL compliant datasets.

2 General compliance for LCI datasets: analysis of existing rules and proposal of new entry-level requirements

This chapter describes the underlying rules of compliance for datasets and studies, in different (ILCD-based, and global) schemes. In order to align the ILCD-EL scheme to the other ILCD-based ones, the rules related to the review process have been redefined.

State of the art

ILCD-based schemes have a set of specific requirements for data and studies, described in Chapters 2.1, 2.2 and 2.3. Essentially, apart from the review process, each scheme is aligned with the others, without contrasting rules or requirements. The differences among ILCD-based schemes are essentially based on diverse rigorousness and applicability of defined requirements. As regards the review process, the ILCD-EL can be better aligned with the other two schemes ('Full' ILCD and PEF/OEF), particularly in terms of criteria for selection of reviewers and review reporting. Therefore in Chapter 2.5 a fine-tuned version of compliance criteria for reviewers in the ILCD EL scheme is proposed.

For comparison, the conformance criteria and review process developed according to the UNEP-SETAC's GGP, at global level, have been also described in Chapter 2.4.

What's new?

The improvement of the ILCD-EL requirements has essentially changed two main compliance criteria, in the review process:

— The selection of reviewers for datasets and studies, through the Reviewer Registry of the EPLCA will become mandatory. In the previous version of ILCD-EL, released in 2012, the use of the Reviewer Registry was not required.

— The review report will become mandatory both for independent internal AND external reviewers (before was mandatory ONLY for independent internal reviewers).

The rationale behind those choices are essentially the following:

— The new eligibility criteria for reviewers (explained in Chapter 3), allows the Registry to automatically spot the eligible reviewers also in the new EL scheme.

— The consistency of the reporting system, with the use of a review template for all the datasets (or studies) facilitates the users and practitioners in the evaluation of data quality and fitness for purpose of LCA data, and improves the objectivity of the reviews.

2.1 ILCD entry-level requirements (current)

Table 1 summarises the entry-level requirements to be fulfilled, in order to make datasets available through the Life Cycle Data Network. The EL requirements touch different aspects of the data, some of them (i.e. format and nomenclature, the latter with some deviation allowed) directly refer to the 'full' ILCD scheme. In terms of documentation, data quality and review, the minimum requirements are referred to the ISO standards, plus some specific provisions for the ILCD-EL scheme.

As mentioned, the EL requirements are defining a set of **minimum rules for the review scheme, this document set a new rule in this framework, which is explained in section 2.4**.

To facilitate the review process and harmonise the quality and consistency of the information provided within the review, a template for a review report has been developed (Annexes I and II). Compared to the template used so far in the LCDN framework, the new one allows the assignment of a score to different data quality aspects, where applicable.

Table 1 ILCD entry-level requirements released in 2012.

Compliance area	ILCD — Entry-level requirements
Format	Use of ILCD format
Documentation	○ Minimum documentation extent specified ○ Based on ISO quality criteria
Nomenclature	○ ILCD nomenclature-compliant documents (e.g. use of ILCD reference elementary flows) ○ Permission of certain aggregated elementary flows (e.g. VOC) ○ Terminology use not enforced
Data quality	*In general following ISO quality criteria* ○ No minimum data quality required ○ ***BUT*** documentation of data necessary, using ISO quality criteria ○ [TeR], [TiR], [GR] to be documented
Method	○ ISO 14040 and 14044 compliant process-based LCA ○ Methodological ILCD compliance not enforced ○ Applied modelling frameworks and allocation/substitution approaches to be documented

Review	○ Use of reviewers from registry not required
	○ 'Qualified reviewer' required (based on 14025)
	  ○ Knowledge of relevant sector
	  ○ Knowledge of represented process or product LCA method expertise and experience
	○ Qualified independent external reviewer in line with ISO 14044 requirements BUT separate review report is NOT required
	OR
	○ Qualified independent internal reviewer in line with ISO 14044 requirements, BUT separate review report is required
	○ Review on unit process level may not be required, depending on data quality claims

2.2 Environmental footprint requirements

As mentioned in the introduction, ILCD entry-level requirements are mandatory in order to create datasets compliant for the Life Cycle Data Network. The Product- and Organisation- Environmental Footprint schemes (PEF/OEF) have a broader set of compliance criteria, but the ILCD-EL is still necessary for the creation of compliant datasets.

Table 2 summarises the PEF/OEF requirements for data, according to general Recommendation 2013/179/EU ([9]) attached to COM(2013) 196. Further details on data quality, documentation and nomenclature system, are specified in the recommendation, and will be partly reviewed in the pilot phase and in the category/sectorial rules definition. So, for a detailed explanation, the reader can refer to the 'single market for green products' website of the European Commission, and the documents contained therein:

http://ec.europa.eu/environment/eussd/smgp/index.htm

([9]) 2013/179/EU — Commission Recommendation.

Table 2 Data quality criteria, documentation, nomenclature and review, according to PEF/OEF recommendations

Data quality criteria	• Technological representativeness ([10]) • Geographical representativeness ([11]) • Time-related representativeness ([12]) • Completeness • Parameter uncertainty ([13]) • Methodological appropriateness and consistency ([14])
Documentation	• Compliant with ILCD requirements
Nomenclature	• Compliant with ILCD nomenclature (e.g. use of ILCD reference elementary flows for IT compatible inventories)
Review	• Review by 'Qualified reviewer' (see Chapter 3): • Separate review report

2.3 'Full' ILCD requirements

The 'full' ILCD quality requirements are carefully described in a dedicated report within the *ILCD Handbook* ([15]). However, it has to be pointed out that so far, full ILCD compliance is NOT required in order to publish data through the LCDN. Moreover, both at the EU level with the PEF/OEF scheme, and at the international level with several activities on data harmonisation (e.g. the Global LCA Access Data project — GLAD ([16])), the criteria for ILCD-based structure of data are only referring to ILCD entry-level requirements, plus specific rules, mentioned in other sections, in different schemes.

Table 3 reports the main differences between ILCD-EL and full ILCD requirements, while Table 4 references the documents and chapters where the detailed compliance rules of the ILCD are defined.

([10]) 'Technological representativeness' is used in EF scheme instead of 'technological coverage' used in ISO14044.
([11]) 'Geographical representativeness' is used in EF scheme instead of 'geographical coverage' used in ISO14044.
([12]) 'Time-related representativeness' is used in EF scheme instead of 'time-related coverage' used in ISO14044.
([13]) 'Parameter uncertainty' is used in EF scheme instead of 'precision' used in ISO14044.
([14]) 'Methodological appropriateness and consistency' is used in EF scheme instead of 'consistency' used in ISO14044.
([15]) *ILCD Handbook* — Review schemes for Life Cycle Assessment.
([16]) http://www.scpclearinghouse.org/working-group/54-global-lca-data-access-network.html

Table 3 comparison between ILCD entry-level (2012 version) and 'full' ILCD requirements

Compliance area	'Full' ILCD requirements (see Table 2.6 for further details)	ILCD — Entry-level requirements
Format	Use of ILCD format	Use of ILCD format
Documentation	Minimum documentation extent specified based on ISO quality criteria	Minimum documentation extent specified based on ISO quality criteria
Nomenclature	ILCD nomenclature-compliant documents (e.g. use of ILCD reference elementary flows) NO aggregated elementary flows (e.g. VOC) ILCD terminology to be used	ILCD nomenclature-compliant documents (e.g. use of ILCD reference elementary flows) Permission of certain aggregated elementary flows (e.g. VOC) Terminology use not enforced
Data quality	Three levels of data quality differentiated ('high quality', 'basic quality', 'data estimate'), covering among others quantitative criteria for accuracy, completeness and precision. Differentiated quality ratings on data quality, methodological consistency, nomenclature, etc. are to be documented inside the dataset.	*In general following ISO quality criteria* No minimum data quality required *BUT* documentation of data necessary, using ISO quality criteria [TeR], [TiR], [GR] to be documented
Method	ISO 14040 and 14044 compliant process-based LCA Methodological ILCD compliance required, differentiated by the archetype goal situations A, B, C1 and C2	ISO 14040 and 14044 compliant process-based LCA Methodological ILCD compliance not enforced Applied modelling frameworks and allocation/substitution approaches to be documented
Review	Use of reviewers from registry not required 'Qualified reviewer' required (based on 14025) Knowledge of relevant sector Knowledge of represented process or product LCA method expertise and experience Qualified independent external reviewer in line with ISO 14044 requirements BUT separate review report is NOT required *OR* Qualified independent internal reviewer in line with ISO 14044 requirements, BUT separate review report is required Review at unit process level may not be required, depending on data quality claims	Reviewers need to be registered in the reviewers' registry (within the Resource Directory of the EPLCA) 'Qualified reviewer' required (based on 14025) Knowledge of relevant sector Knowledge of represented process or product LCA method expertise and experience Qualified independent external reviewer in line with ISO 14044 requirements *OR* Qualified independent internal reviewer in line with ISO 14044 requirements, In both cases separate review report is required (the ILCD template/minimum review documentation scope in addition to review documentation must be provided within dataset) Review on unit process level may not be required or disclosed, depending on data quality claims

Table 4 detailed references for 'full' ILCD requirements

Aspect	Components	Description/Comment	Main chapters in *ILCD handbook* ([17])
Quality	Completeness	Three levels of data quality Defined ('high quality', 'basic quality', 'data estimate'). Details see Table 5, Table 6, and Table 7 of the 'Specific guide for LCI datasets'.	Chapter 12.3 of the 'Specific guide for LCI datasets'
	Technological, geographical and time-related representativeness		
	Precision/ uncertainty		
	Methodological appropriateness and consistency		
Method	Application of LCI modelling and method provisions of this document	ISO 14040 and -44 compliant process-based LCA. Methodologically ILCD compliant, differentiated by the goal situations A, B, C1, and C2.	Chapter 6.5.4 and referenced chapters of the 'Specific guide for LCI datasets'.
	Application of other method provisions of this document	Adhering to the other method provisions of this document.	Other chapters of the 'Specific guide for LCI datasets'
Nomen-clature	Correctness and consistency of applied nomenclature and basic reference dataset objects	Appropriate naming of flows and processes, consistent use of ILCD reference elementary flows, appropriate and consistent use of units, etc.	Separate document 'Nomenclature and other conventions' — ILCD reference elementary flows, flow properties and unit group datasets see also Chapter 7.4.3 of 'Specific guide for LCI datasets')
	Correctness and consistency of applied terminology	Correct and consistent use of technical terms (LCA and other domains).	Key terms of Chapter 3 of the 'General guide for LCA'
Review	Appropriateness of applied review type	Selection of the minimum required review type, i.e. here an 'Independent external review', as ILCD-registered qualified reviewer.	Chapter 11 and separate document 'Review schemes for Life Cycle Assessment (LCA)'.
	Correctness of review scope	Correct scope of what is reviewed.	
	Correctness of review methods	Correct methods of how to review each of the items within the review scope.	
	Correctness of review documentation	Correct scope, form and extent documentation about the final outcome of the review, '*ILCD Handbook* — Review report template' is required.	
Document ation	Appropriateness of documentation extent	Documentation compliant as defined in the '*ILCD Handbook* — Specific guide	Separate document 'ILCD — Documentation of LCA datasets' ([18]) and Chapter

([17]) All the books are referred to the *ILCD Handbook* series, in brackets the title of the specific book.

([18]) International Reference Life Cycle Data System (ILCD) — Documentation of LCA datasets.

Aspect	Components	Description/Comment	Main chapters in *ILCD handbook* ([17])
		for LCI datasets'. NB: Depending on intended applications and target audience further information may be required in line with ISO 14044 and the *ILCD Handbook*: see under 'Reporting' in 'Specific guide for LCI datasets'. Minimum documentation extent specified in separate document 'ILCD — Documentation of LCA datasets'. Appropriate coverage and correctness and appropriateness of what is reported/documented.	10 of the 'Specific guide for LCI datasets', depending on target audience and intended applications.
	Appropriateness of form of documentation	Selection of the applicable form(s) of reporting/ documentation, i.e. here a process dataset, preferably with an attached/referenced LCI study report.	Chapter 10.3 of the 'Specific guide for LCI datasets'.
	Appropriateness of documentation format	Selection and correct use of the dataset format or report template, plus review documentation requirements. (Additional requirements for ILCD Data Network (is only 'should' requirement in *ILCD Handbook*).	ILCD dataset format and LCA report template (for LCI study reports) ([19]).

2.4 Global schemes: UNEP-SETAC 'Shonan GGP and conformance criteria'

In 2011, the United Nations Environment Programme (UNEP) in collaboration with the Society of Environmental Toxicology and Chemistry (SETAC), in the framework of the life cycle initiative released the 'Global Guidance Principles for Life Cycle Assessment Databases' ([20]) also known as 'GGP' or 'Shonan Guidance'.

The original document provides detailed guidance on how to develop unit and aggregated process data, as well as data review and documentation, and other aspects linked to LCI-LCA practice and datasets development. In the Life Cycle Initiative framework (flagship 2a), the action called 'Shonan Database Conformance Project' has the following goals:

— Create an interactive map to visualise databases worldwide, with properties;
— Develop conformance criteria;
— Apply the criteria to existing databases.

([19]) http://eplca.jrc.ec.europa.eu/LCDN/developer.xhtml
([20]) Global Guidance Principles for Life Cycle Assessment Databases — A basis for greener processes and products.

A working group coordinated by Dr Andreas Ciroth (Greendelta Gmbh), has worked on the creation of LCI dataset review criteria, and the final document will be published soon ([21]). A draft version is now released ([22]) and was presented at the Data review and Global Guidance Principles Conformance workshop, during the SETAC Europe Conference in Nantes (September 2016).

According to the mentioned document to be published, the criteria for the review of LCI datasets are reported in the following table.

Table 5 Proposed dataset review and conformance criteria according to the GGP

	Values/ score	Scope		
		Data set	Flows/ exchanges	Other dataset fields
Goal and scope completeness				
Reference time	Yes/No	X		
Reference geography	Yes/No	X		
Reference technology	Yes/No	X		
Reference model completeness	Yes/No	X		
Reference sample completeness	Yes/No	X		
Sample approach (scientific or expert-based)	Sci/Exp	X		
Supported LCIA methods (version number)	Text	X		
Conformance				
Time-related conformance	1-5		X	X
Geographical conformance	1-5		X	X
Technological conformance	1-5		X	X
Model completeness conformance, flows and documentation	1-5	X		
Sample conformance, correctness and reliability				
Sample conformance	1-5	X		
Accuracy of the provided information	1-5	X		
Precision of the provided information	1-4		X	
Reliability of the provided information	1-5		X	X
Consistency of the provided information	1-5		X	X
Materiality				
Mass and energy balance in line with goal and scope	1-5	X		
LCIA results in line with goal and scope	1-5	X		
Order of five main drivers for main LCIA results in line with goal and scope	1-5	X		
Procedural and metadata information				
Number of reviewers and relation to data provider/developer	1-5	X		
Data access	1,3,5	X		

The sections cover all aspects relevant for review of datasets. The authors propose to use the following acronym for the set of indicators: **gmvrp:** goal (goal and scope completeness); model (conformance of modelled time, geography technology); value (representativeness, accuracy, precision and so forth of the numeral values provided); relevance (materiality), and procedure (procedural and meta-information).

([21]) http://www.greendelta.com/fileadmin/user_upload/GD/UNEP_GGP_LCAXV_final.pdf
([22]) Ciroth, A. et al., Life Cycle Inventory Dataset Review Criteria Development — Review and Shonan Global Guidance Principles Criteria, V.2.3. TBP.

2.5 NEW ILCD entry-level requirements for review

According to the *ILCD Handbook*, and in order to harmonise the review process within the LCDN, a **new set of rules, related to the review process, in the ILCD-EL scheme, has been developed**.

The new rules are essentially changing two aspects of the old EL requirements, aligning the ILCD-EL with the 'full ILCD' scheme:

- The use of the Reviewer Registry of the Resource Directory of the EPLCA, for the selection of reviewers will be mandatory (according to the 'full' ILCD scheme). The tool is accessible for free, both for potential reviewers and users looking for eligible reviewers (or teams). It automatically assesses the eligibility of reviewers and teams.
- The separate review report, which in the old scheme was mandatory only for internal review, is now mandatory for any type of review.

The use of independent, internal reviewers, is still allowed, in order to facilitate the review process and the selection of potential reviewers, but they have to be registered in the Reviewer Registry.

Table 6 summarises the new entry-level requirements. **All the datasets released after 1 July 2017 will be required to follow those requirements**

Table 6 New ILCD entry-level requirements, the previous rules amended by this document are in strikethrough blue text, while the new rules are in red

Compliance area	**ILCD — Entry-level requirements**
Format	Use of ILCD format
Documentation	○ Minimum documentation extent specified ○ Based on ISO quality criteria
Nomenclature	○ ILCD nomenclature-compliant documents (e.g. use of ILCD reference elementary flows) ○ Permission of certain aggregated elementary flows (e.g. VOC) ○ Terminology use not enforced
Data quality	*In general following ISO quality criteria* ○ No minimum data quality required ○ ***BUT*** documentation of data necessary, using ISO quality criteria ○ [TeR], [TiR], [GR] to be documented
Method	○ ISO 14040 and 14044 compliant process-based LCA ○ Methodological ILCD compliance not enforced ○ Applied modelling frameworks and allocation/substitution approaches to be documented

Review	○ ~~Use of reviewers from registry not required~~ Reviewers need to be registered in the reviewers' registry (within the Resource Directory of the EPLCA)
	○ 'Qualified reviewer' required (based on 14025):
	  ○ Knowledge of relevant sector;
	  ○ Knowledge of represented process or product LCA method expertise and experience.
	○ Qualified independent external reviewer in line with ISO 14044 requirements ~~BUT separate review report is NOT required~~
	OR
	○ Qualified independent internal reviewer in line with ISO 14044 requirements, ~~BUT separate review report is required~~
	In both cases separate review report is required (the ILCD template and minimum review documentation scope in addition to review documentation must be provided within dataset)
	○ Review on unit process level may not be required or disclosed, depending on data quality claims

2.6 Conclusions

According to the abovementioned rules, both for ILCD-based schemes and at the international level, the review process is an essential step in order to ensure quality and consistency of LCI datasets. To achieve this goal, the review schemes have to be harmonised, streamlined and standardised as much as possible. Moreover, a consistent structure of review reports can facilitate the final users of data, in assessing the overall quality and the fitness for purpose of datasets. In this framework, the ILCD entry-level requirements, released in 2012, have been partly amended in this document, in order to ensure a more consistent review process, and facilitate the selection of qualified reviewers, within the Life Cycle Data Network context.

3 Reviewer types and qualifications in different schemes, and new eligibility criteria for ILCD entry level

State of the art

'Full' ILCD and PEF/OEF schemes have a set of specific eligibility criteria for reviewers, described in Chapter 3.3 and used for the reviewers' (or teams') automatic eligibility assessment, in different schemes, within the Reviewer Registry of the EPLCA (Chapters 3.1 and 3.2). The GGP scheme defines the requirements in a broader manner, without defining a minimum level of experience in different required aspects. While so far the ILCD entry-level scheme was not setting any minimum level of qualification for reviewers.

As regards the number and type of reviewer (i.e. the relationship between the reviewer and the data/study developer or owner), the different schemes, including all the ILCD-based schemes and the GGP, define the minimum requirements to be fulfilled. Those requirements are detailed and compared in Chapter 3.6.

What's new?

The improvements of the ILCD-EL requirements consist in some eligibility criteria for reviewers and reviewer teams, explained in Chapter 3.5. The rationale behind the selection of the new criteria are the following:

— The new requirements cover only the mandatory skills, already required in the other ILCD-based schemes (see section 3.3);

— The required experience in different eligibility criteria is slightly less stringent than the other schemes;

— The thresholds have been defined according to the PEF/OEF criteria, taking as minimum years of experience the upper limit of the 'score zero' column, for the mandatory PEF/OEF criteria (see the example in Chapter 3.5 for further details);

— The minimum number of entry-level requirements to fulfil in order to be eligible as single reviewer, member of a review team, or (complete) team of reviewers, follow the same approach of the PEF/OEF scheme.

3.1 General requirements and role of the Reviewer Registry

In order to assess the eligibility of potential reviewers according to different schemes, a set of information is necessary. The required information is linked both to personal and professional skills of potential reviewers or reviewer teams, and can regard the following aspects: languages spoken, country/ies, career information, education, list of previous/current employers, years of experience, number of reviews, accreditation as third party reviewer, attended courses, review practice chair, review practice trainer, sectors of work experience and years. This information is necessary to be able to judge whether a given reviewer can review a given LCI dataset or LCA study.

In this framework the Reviewer Registry (RR) of the European Platform on LCA, available in the Resource Directory section ([23]), provides a list of qualified reviewers from different countries/sectors, based on the self-declared information on expertise and knowledge. The tool assesses automatically the eligibility of single reviewers (or teams of reviewers) according to different compliance schemes (ILCD, ILCD-EL, PEF/OEF) as reported in Figure 1. In principle the RR can be expanded in order to assess the admissibility of

([23]) http://eplca.jrc.ec.europa.eu/ResourceDirectory/

reviewers also under different schemes (e.g. in the 'Shonan GGP' framework), if the eligibility criteria are based on the same information already declared.

Figure 1 Screenshot of a reviewer's profile in the Reviewer Registry of the EPLCA

During registration in the Resource Directory, potential reviewers interested in being visible, can choose among different reviewer's profiles (either single reviewer and/or, member or leader of reviewer's team). Based on the information provided, the system can automatically calculate the level of compliance of the reviewer under different schemes. Users can be eligible as single reviewers and/or members of a reviewer team. The team can be registered as well in the appropriate section, but single members have to register separately. The eligibility of a team of reviewers as a panel is calculated on the sum of required skills and expertise of the members.

3.2 Browsing the Reviewer Registry

For all the users interested in finding reviewers within the RR a searching tool is available, and allows to search the reviewers according to different criteria: full text research, eligibility scheme, sector (according to NACE codes), and single reviewers or teams (see Figure 2).

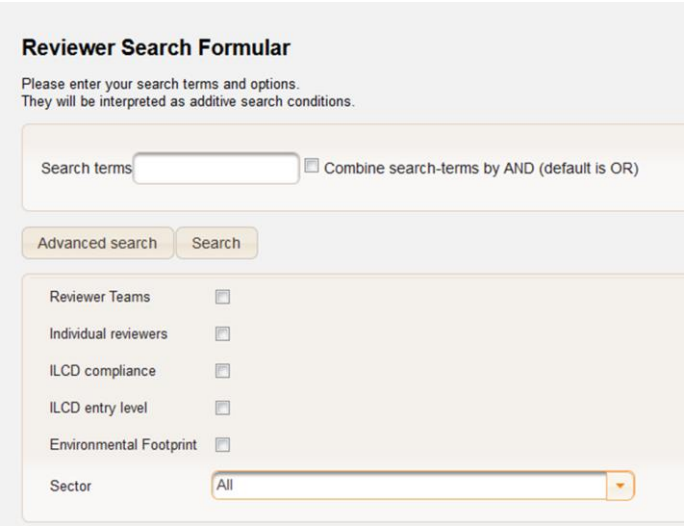

Figure 2 Reviewer Registry searching tool

3.3 Minimum requirements for reviewers in ILCD-based schemes

The different schemes analysed in this document have some eligibility criteria for reviewers, both the 'full' ILCD and the PEF/OEF guidance assign a progressive score to the single reviewers or teams.
In this document only the minimum requirements for eligibility are reported in detail. The current version of the RR is not able to score the reviewers, in different schemes, but is only able to assess the eligibility, according to the minimum requirements in each scheme.
Detailed guidance on eligibility, skills and scoring of reviewers is available both in the *ILCD Handbook* ([24]) and in Recommendation 2013/179/EU ([25]) which defines the PEF/OEF general rules.
Beyond the minimum requirements defined in Chapter 3.2., the other schemes also have some eligibility criteria for reviewers, both the 'full' ILCD and the PEF/OEF guidance assign a progressive score to the single reviewers or teams; however, in this document only the minimum requirements for eligibility are reported in detail. The current version of the RR is not able to score the reviewers, in different schemes, but is only able to assess the eligibility, according to the minimum requirements in each scheme.
Detailed guidance on eligibility, skills and scoring of reviewers is available both in the *ILCD Handbook* ([26]) and in Recommendation 2013/179/EU ([27]) which defines the PEF/OEF general rules.
In Table 7 the minimum requirements for reviewers are defined, in order to be eligible in the 'full' ILCD and the PEF/OEF schemes, plus some additional (not mandatory) requirements, that assign to the reviewers additional points in order to reach the overall minimum score for eligibility.

([24]) *ILCD Handbook* — Reviewer qualification for Life Cycle Inventory datasets.
([25]) 2013/179/EU: Commission Recommendation of 9 April 2013.
([26]) *ILCD Handbook* — Reviewer qualification for Life Cycle Inventory datasets.
([27]) 2013/179/EU: Commission Recommendation of 9 April 2013.

*Table 7 Comparison table of **minimum** requirements for reviewers' eligibility in different schemes. Full ILCD and PEF/OEF have scoring systems, depending on experience of the reviewer, that are not reported in this table*

			'Full' ILCD	PEF/OEF [6]
MANDATORY SKILLS score = 1 per field, if the requirement is fulfilled				
Verification and audit practice	Years of experience [1]		3	3
	Number of reviews [2]		3	3
LCA methodology and practice	Years of experience [3]		3	3
	Participation in LCI work [4]		5	5
Knowledge of technologies or other activities, by sector				
NACE main sector	Eligibility is per sector covered [5]	Years in private sector	3	3 in total public/private
		Years in public sector	3	
Extra information (**NOT MANDATORY** giving a score if 'yes')				
Verification and audit practice	Accreditation as 3rd party reviewer for EPD, ISO 14001 or other EMS		Yes = 2 points	Yes = 2 points
	Courses on environmental audits (min 40 hours)		Yes = 1 point	Yes = 1 point
	Chair of review panels for LCA studies		Yes = 1 point	Yes = 1 point
	Qualified trainer in environmental audit course		Yes = 1 point	Yes = 1 point
LCA methodology and practice	At least five peer-reviewed papers on LCA method		Yes = 1 point	
	At least three research projects participated, on LCA method or case studies		Yes = 1 point	
Technologies or other activities represented by LCI dataset	PhD (relevant sector) obtained		Yes = 1 point	
	Master thesis or equivalent (relevant sector)		Yes = 1 point	
	At least 3 years of work experience outside the private sector		Yes = 1 point	
	Work experience in additional sectors	number of additional sectors	0.5 point per extra sector	
Minimum total score	Independent reviewer		Total > 10 + minimum mandatory requirements met	Total score > 6 + minimum 3 cumulated in the mandatory fields
	Reviewer eligible for a team		Total > 5 + minimum mandatory requirements met	If total score is > 1 in one of the mandatory fields
	Reviewer team		Total of members > 10 + mandatory requirement minimum 1 each	Total score of members > 6 + minimum 3 cumulated in the mandatory fields

[1] Experience in auditing and review in the environmental field not only LC-based; [2] As reviewer, LCA (ISO, ILCD or EF compliant) or EPDs or LCI datasets, other LC-based schemes; [3] Starting from Master's degree if mainly focused on LCA; [3] Development/modelling of LCI datasets (documented); [5] Experience by specific macro sector (NACE), at any level (work, monitoring, management, R & D etc.); [6] In the PEF scheme, the minimum requirements here reported are referred to the experience required in order to reach a score of 1 point in each of the mandatory skills.

3.4 Minimum requirements for reviewers in GGP

At the international level, the minimum requirements for reviewers are defined in a broader and more general manner. Chapter 4.3.1 of the Global Guidance Principles ([28]) for LCA databases defines the requirements for reviewers as the following:

'Independence, expertise, and experience of the reviewers are vital. The four main qualification aspects for reviewers are: LCA methodology expertise, knowledge of applicable review rules, review or verification experience, technical, engineering, scientific, or economic expertise on the process or product that is represented by the dataset that is to be reviewed.'

Because the general GGP requirements are not scored, they cannot be automatically searched and reported in comparison tables.

3.5 NEW requirements for reviewers in ILCD entry-level scheme

A set of minimum eligibility requirements for reviewers of ILCD entry-level compliant data has been developed, and summarised in Table 8. The new set of requirements refers only to the mandatory skills, already required in the other ILCD-based schemes (see section 3.3). Moreover, the required experience in different eligibility criteria is slightly less stringent than for the other schemes. Particularly, the thresholds have been set according to the PEF/OEF criteria, taking as minimum years of experience the upper limit of the 'score zero' column, for the mandatory criteria.

Example:
In PEF scheme, for the verification and audit practice the scoring system is the following: **< 2 years** = score 0; 3-4 years = score 1; 5-8 years = score 2; 9-14 years = score 3; > 14 years = score 4. In this case the minimum requirement **for ILCD EL Scheme has been set at > 2 years**, just above the 'zero score threshold' for PEF/OEF.

According to the approach adopted in PEF/OEF scheme, the users registered in the RR can be eligible as single reviewers only if they fulfil all the minimum requirements. A reviewer is entitled to be part of a team only if is reaching the minimum requirements in at least one of the eligibility criteria. For reviewers' teams, in order to be visible as ILCD-EL Compliant, the sum of the competences of the members of a team has to cover the whole set of minimum requirements.

([28]) Global Guidance Principles for Life Cycle Assessment Databases — A basis for greener processes and products.

Table 8 Minimum requirements for reviewer's eligibility in the ILCD entry-level scheme, compared to PED/OEF

		NEW ILCD EL	PEF 'score 0'	PEF 'score 1'
Verification and audit practice	Years of experience [1]	> 2	0-2	3-4
	Number of reviews [2]	> 2	0-2	3-5
LCA methodology and practice	Years of experience [3]	> 2	0-2	3-4
	Participation in LCI work [4]	> 4	0-4	5-8
Knowledge of technologies or other activities, per sector covered [5]				
NACE main sector	Years of experience in public and/or private organisations	> 2	0-2	3-4

[1] Experience in auditing and review in the environmental field not only LC-based; [2] As reviewer, LCA (ISO, ILCD or EF compliant) or EPDs or LCI datasets, other LC-based schemes; [3] Starting from Master's degree if mainly focused on LCA; [4] Development/modelling of LCI datasets (documented); [5] Experience by specific macro sector (NACE), at any level (work, monitoring, management, R & D, etc.); [6] In the PEF scheme, the scoring system starts from zero, and for each mandatory field a range of years of experience or skills required is defined, which corresponds to 'no score' or value zero. NB in the PEF/OEF Scheme the score 1, is essentially starting with a + 1 (year or skill) in all the considered mandatory fields, thus, the new ILCD-EL is slightly less stringent than the 'Score 1' Threshold in the PEF/OEF Scheme.

3.6 Number of reviewers, and relations with data owner required in ILCD entry-level and other schemes

The different schemes considered in this section define also the number of reviewers required for the evaluation of LCI datasets and LCA studies, and their relationship with the data owners (developers and/or providers).
Therefore, the criteria for the choice of the appropriate reviewer is not only related to the skills and qualification of the reviewer or the team, but also to the relationship between the reviewer and the data developer/provider.

As regards the relationship of the reviewer/team with the data developer or provider the following cases can be identified:

- **Independent external reviewer/team**: the reviewer shall not be involved in the definition or development of the reviewed case. This includes both the reviewer as a person and the employer (if any) as an organisation. The person or team has to be external, and without relevant relations for at least 1 year to any organisation that performed, commissioned, financed or otherwise had relevant influence on the study to be reviewed. The phrase 'relevant relations' includes financial (beyond the agreement for the review itself and other reviews in the same framework, which are of course allowed), legal or similar ties that would result in a conflict of interest such as subsidies, joint-venture partners, development partners, sales partners, or any other strategic cooperation partners.
- **Independent internal reviewer/team**: the reviewer shall not be involved in the study to be reviewed, or quantitatively relevant parts (e.g. background data) but can be part of the organisation that performed or commissioned the LCA work (or related third party organisations).
- **Dependent internal reviewer/team**: the reviewer can be involved in the study to be reviewed, or quantitatively relevant parts (e.g. background data) and part of the organisation that performed or commissioned the LCA work. This type of reviewer is defined by ISO standard, but is not eligible in the schemes considered in this report.

According to those definitions the different schemes have diverse requirements in terms of type and minimum numbers of reviewers to be used, as reported in Table 9.

In the table only the minimum requirements are reported, but, apart from the ILCD entry level scheme, the other review systems assign a score to the reviewers, and/or the review itself, according to specific rules. For Full ILCD and PEF/OEF the score is assigned to the reviewer/team, depending on the expertise, while in the Shonan GGP and conformance criteria, the score is assigned to the reviewer type and number (1 for two or more independent external reviewers, 2 for one independent AND one or more internal reviewers, 3 for one independent OR two or more internal reviewers, 4 for one internal reviewer, 5 for no review (not compliant with public datasets) — the lower the score, the higher the quality).

Table 9. Minimum requirements for number and type of reviewers in different schemes

Minimum requirements[1]	ILCD entry level	'Full ILCD'	PEF/OEF	Shonan GGP and conformance criteria
Number of reviewers	≥ 1	≥ 1	≥ 1	≥ 1
Number of Team members in panel review	≥ 2	≥ 3	≥ 3	≥ 3
Cases requiring panel (team) review	Only if single reviewer doesn't meet all the individual minimum requirements	If single reviewer doesn't meet the minimum requirements OR in case of meso-macro level LCA studies, development of LCIA models and LC-based indicators	If single reviewer doesn't meet the minimum requirements OR in case of public PEF/OEF studies supporting comparative assertions	Not for datasets, but for public studies supporting comparative assertion
Reviewer (or team) type	Independent reviewer/team both internal or external	Independent external reviewer/team	Independent external reviewer/ team	Independent internal or external reviewer, external is recommended for public datasets

[1] Apart from the ILCD entry-level scheme, the other review systems are assigning a score to the reviewers, and the review process, according to specific rules. See dedicated guidance documents of each scheme for details

3.7 Conclusions

According to the abovementioned criteria, the qualification of reviewers is essential to ensure the reliability and consistency of reviews in different schemes. The number of reviewers and their relationship with data owners are also key issues, that are differently treated according to the scheme and the type of dataset.

The ILCD-EL report, released in 2012, did not define minimum requirements for reviewers. The minimum set of entry-level rules defined in this document is in line with the approach of the other ILCD-based schemes, even if with less stringent requirements. This will improve and further harmonise the review approaches in the Life Cycle Data Network system.

4 Summary and next steps

This report achieved three main goals:

- Explaining the review procedures and review selection process and eligibility criteria, according to different ILCD-based schemes, taking into account also current international initiatives;
- Proposing updated requirements for the ILCD entry-level scheme, aiming at increased harmonisation, in particular concerning consistency of review reporting, and reviewer selection;
- Setting minimum requirements for reviewers also in the ILCD entry-level scheme, in line with the minimum requirements in the other ILCD-based frameworks, but slightly less stringent in terms of experience required.

The new rules will become mandatory, for the new datasets, submitted into the Life Cycle Data Network system, from 1 July 2017, after a transitional period. From January to June 2017, the submitted datasets can follow either the old (2012) or the new compliance rules. The datasets already in the LCDN will remain in the system, until the end of the validity period, even if the validity is extended. If the datasets are renewed, they have to follow the same rules of the new datasets.

The role and use of the Reviewer Registry tool, contained in the Resource Directory of the European Platform on LCA, plays a key role in this context. The tool is able to store information on education, career and individual skills of potential reviewers or teams, and to automatically assess the eligibility in three different schemes (ILCD-EL, PEF/OEF and 'full' ILCD).

So far, only minimum requirements are assessed by the tool, but the aim, for future developments, is also to allow the ranking of reviewers, for the schemes adopting a scoring system.

Moreover, when a final document on GGP conformance and review criteria will be released, the JRC will explore the possibility of expanding the Reviewer Registry, in order to include the eligibility criteria also for the international schemes.

ANNEX I review report template with comments

Comments and suggestion on how to fill in the different fields are reported in red within the tables below

LCI review report (against 'ILCD Data Network — entry-level requirements')

TABLE 1 General review reporting items

REVIEW REPORTING			
General information			
Dataset name	Name of the dataset, e.g. Electricity grid mix 1 kV-60 kV; AC; consumption mix, at consumer; 1 kV-60 kV		
Dataset UUID and version number	Unique Identifier (UUID) of the dataset (the filename is a 36 digits alphanumeric code with the following structure xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx		
Dataset locator (e.g. Permanent URI, URL, contact point, or database name and version, etc.)	Permanent URI, URL, contact point, or database name and version, etc.		
Dataset owner	Owner of the copyright of the dataset		
Review commissioner(s)	Owner of the dataset or dataset/ database developer or supplier		
Reviewer name(s) and affiliation(s), contact			
Review type applied	See Chapter 3.4 for type of review		
Date of review completion (DD/MM/YYYY)			
Reviewed against/Compliance system name	**ILCD Data Network — Entry-level requirements; others, if any**		
Reviewer assessment:			
Aspect	**Yes**	**No**	**Comments**
Quality compliance (aspects of ISO 14040 and 14044) fulfilled (see Table 2)			Entry-level fulfilled, overall quality of aspects in Table 2
Method compliance (as in ISO 14040 and 14044) fulfilled and documented in dataset			How and to what extent the documentation fulfils the ISO requirement for method compliance
Nomenclature compliance (see Table 3) fulfilled			Nomenclature is in line with ILCD flowlist? If not what is deviating?
Documentation compliance (see Table 3) fulfilled			Entry level is fulfilled? How? And if not what is deviating?
Review compliance fulfilled			Independent external review OR independent internal review both with review report
Overall compliance with ISO 14040 and 14044			If not what is not compliant?
Overall compliance with 'Compliance system'			ILCD EL mandatory, if not what is not compliant? Other schemes compliance (if any)
Date, location, reviewer signature			

TABLE 2 Specific/detailed review reporting items for LCI dataset: Quality compliance (ISO 14040 and 14044). Please note that for aggregated LCI result datasets, this includes key processes in the background system.

ITEMs	Score or judgement	Comments
Time-related coverage/representativeness: 'age of data and the minimum length of time over which data should be collected' 'qualitative assessment of the degree to which the dataset reflects the true population of interest'	Judgement or score (e.g. Good or 2) depending on data quality requirements of the sche-me adopted	Age of the foreground and background data collected, recalculations/adaptations if any, representativeness of the population of interest, time of data collection.
Geographical coverage/representativeness: 'geographical area from which data for unit processes should be collected to satisfy the goal of the study' 'qualitative assessment of the degree to which the dataset reflects the true population of interest'	As above	Reference area of the data, real area of data collection, representativeness of the areas for foreground and background data.
Technology coverage/representativeness: 'specific technology or technology mix' 'qualitative assessment of the degree to which the dataset reflects the true population of interest'	As above	Type of data (specific technology or mix), representativeness (%) of the considered technology respect to the data content, in foreground and background data collected.
Precision: 'measure of the variability of the data values for each data expressed (e.g. variance)'	As above where applicable	Known/unknown, if known which is the degree of precision and how it is assessed
Completeness: 'percentage of flow that is measured or estimated'; assessed on level of process	As above where applicable	Known/unknown, if known Percentage of relevant flows quantified, percentage of impact categories covered
Consistency: 'qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis"	As above where applicable	Models, sources, and software (or methods) used for calculations and LCI are the same or different? Which models/sources/methods have been used, in case of differences explain why.
Sources of the data; Appropriateness of use primary/secondary data source	As above where applicable	How the foreground and background processes have been modelled? Which kind of sources have been used for foreground and background data?
Uncertainty of the information (e.g. data, models and assumptions).	As above where applicable	Known/unknown? Models, data sources and primary data have been reviewed by sectorial experts? Information for uncertainty assessment are disclosed to the reviewer?
Others		

TABLE 3 Specific/detailed review reporting items for LCI dataset: Nomenclature and documentation

ITEMs	Comments
Nomenclature	
Correctness and consistency of applied nomenclature (use of ILCD flows + some aggregated flows allowed is mandatory for LCDN; Correct nomenclature of other flows; Exclusion of not permissible flows, sum indicator elementary flows, etc.)	The nomenclature used is consistent (uniform)? Which nomenclature system(s) have been used (ILCD nomenclature + some aggregated flow allowed is mandatory to share data through the LCDN). Is the nomenclature used consistent from the inventory phase? If not how the nomenclature has been changed? (Matching lists? Mapping files? Converters?). The derived nomenclature has been checked?
Documentation	
Appropriateness of documentation (see Document 'Documentation of LCA data sets')	Documentation is or not compliant? It enables a fair appraisal of the dataset or not? Which information are detailed? Which are lacking (if any)? Metadata are detailed enough and respecting ILCD entry-level requirements?
Appropriateness / correctness of documentation form (ILCD Format)	The ILCD format is respected? The document has been validated with the Validation Tool? The uncompliant aspects (if any) have been solved? (in order to share data through the LCDN the data package has to be submitted in correct ILCD format).

Additional Information if any

References documents referred/accessed by the reviewer either public or confidential

ANNEX II Review report template (Clean)

LCI Review report (reviewed against 'ILCD Data Network — entry-level requirements')

TABLE 1 General review reporting items

REVIEW REPORTING			
General information			
Dataset name			
Dataset UUID and version number			
Dataset locator			
Dataset owner			
Review commissioner(s)			
Reviewer name(s) and affiliation(s), contact			
Review type applied			
Date of review completion (DD/MM/YYYY)			
Reviewed against/Compliance system name	**ILCD Data Network — Entry-level requirements**		
Reviewer assessment:			
Aspect	**Yes**	**No**	**Comments**
Quality compliance (aspects of ISO 14040 and 14044) fulfilled (see Table 2)			
Method compliance (as in ISO 14040 and 14044) fulfilled and documented in dataset			
Nomenclature compliance (see Table 3) fulfilled			
Documentation compliance (see Table 3) fulfilled			
Review compliance (Independent external review OR independent internal review + review report) fulfilled			
Overall compliance with ISO 14040 and 14044			
Overall compliance with 'Compliance system'			
Date, location, reviewer signature			

TABLE 2 Specific/detailed review reporting items for LCI dataset: Quality compliance (ISO 14040 and 14044). Please note that for aggregated LCI result datasets, this includes key processes in the background system.

ITEMs	Score or judgement	Comments
Time-related coverage/representativeness: 'age of data and the minimum length of time over which data should be collected' 'qualitative assessment of the degree to which the dataset reflects the true population of interest'		
Geographical coverage/representativeness: 'geographical area from which data for unit processes should be collected to satisfy the goal of the study' 'qualitative assessment of the degree to which the dataset reflects the true population of interest'		
Technology coverage/representativeness: 'specific technology or technology mix' 'qualitative assessment of the degree to which the dataset reflects the true population of interest'		
Precision: 'measure of the variability of the data values for each data expressed (e.g. variance)'		
Completeness: 'percentage of flow that is measured or estimated'; assessed on level of process		
Consistency: 'qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis'		
Sources of the data; Appropriateness of use primary/secondary data source		
Uncertainty of the information (e.g. data, models and assumptions).		
Others		

TABLE 3 Specific/detailed review reporting items for LCI dataset: Nomenclature and documentation

ITEMs	Comments
Nomenclature	
Correctness and consistency of applied nomenclature (Preferred use of ILCD flows etc.; Correct nomenclature of other flows; Exclusion of not permissible waste flows, sum indicator elementary flows, etc.)	
Documentation	
Appropriateness of documentation (see Document 'Documentation of LCA datasets')	
Appropriateness / correctness of documentation form (ILCD Format)	

Additional Information

References

References

2013/179/EU: Commission Recommendation of 9 April 2013 on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations.

COM(2013) 196 — Communication from the Commission to the Council and the European Parliament — Building the Single Market for Green Products Facilitating better information on the environmental performance of products and organisations

EPLCA Resource Directory: http://eplca.jrc.ec.europa.eu/ResourceDirectory

European Commission — Joint Research Centre — Institute for Environment and Sustainability: International Reference Life Cycle Data System (ILCD) Data Network — Compliance rules and entry-level requirements. Version 1.1, 2012. EUR 24380 EN. Luxembourg. Publications Office of the European Union; 2012.

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List of abbreviations

EPLCA = European Platform on Life Cycle Assessment
GLAD = Global LCA Access Data (network)
ILCD = International Life Cycle Data system
'Full' ILCD = Following the *ILCD Handbook* rules
ILCD EL = ILCD Entry Level (following EL Rules)
ILCD-based schemes = 'Full' ILCD, ILCD EL and PEF/OEF
LCA = Life cycle assessment
LCDN = Life Cycle Data Network
LCI = Life cycle inventory
NACE = Statistical Classification of Economic Activities in the European Community
OEF = Organisation environmental footprint
PEF = Product environmental footprint
RD = Resource directory
RR = Reviewer registry
SETAC = Society of Environmental Toxicology and Chemistry
UNEP = United Nations Environment Programme

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